

CLAIMS

We claim:

1. A process for producing algae-resistant roofing granules, the process comprising:
 - (a) providing inert base particles;
 - (b) forming first intermediate particles by coating the inert base particles with a first mixture including;
 - at least one algaecidal material, and
 - a void-forming material, the void-forming material releasing gaseous material at temperatures above 90 °C, and having an average particle size no larger than 2 mm,to form a first layer on the inert base particles.
2. The process of claim 1, the process further comprising
 - (c) forming second intermediate particles by coating the first intermediate particles with a second mixture including a coloring material; and
 - (d) heating the second intermediate particles to release the gaseous material and form pores in the first layer to produce the roofing granules.
3. A process for producing algae-resistant roofing granules, the process comprising:
 - (a) providing inert base particles;
 - (b) forming first intermediate particles by coating the inert base particles with a first mixture including;
 - at least one algaecidal material, and
 - a void-forming material, the void-forming material releasing gaseous material at temperatures above 90 °C, and having an average particle size no larger than 2 mm,to form a first layer on the inert base particles;
 - (c) forming second intermediate particles by coating the first intermediate particles with a second mixture including a coloring material; and
 - (d) heating the second intermediate particles to release the gaseous material and form pores in the first layer to produce the roofing granules.

4. A process according to claim 3 wherein the first mixture further includes a binder.
5. A process according to claim 4 wherein the binder comprises an aluminosilicate material and an alkali metal silicate.
6. A process according to claim 5 wherein the aluminosilicate material is selected from the group comprising clay.
7. A process according to claim 3 wherein the second mixture further includes a binder.
8. A process according to claim 7 wherein the binder comprises an aluminosilicate material and an alkali metal silicate.
9. A process according to claim 3 wherein the at least one algaecidal material is selected from the group consisting of copper compounds and zinc compounds.
10. A process according to claim 3 wherein the at least one algaecidal material is cuprous oxide.
11. A process according to claim 10 wherein the cuprous oxide comprises at least 2 percent of the algae resistant granules.
12. A process according to claim 3 wherein the at least one algaecidal material is zinc oxide.
13. A process according to claim 12 wherein the zinc oxide comprise at least 0.1 percent by weight of the algae-resistant granules.
14. A process according to claim 3 wherein the void-forming material comprises a substance selected from the group comprising ground walnut shells, sugar, and carbon black.
15. A process according to claim 14 wherein the void-forming material comprises at least 0.1 percent by weight of the algae-resistant granules.
16. A process according to claim 3 wherein the coloring material is selected from the group comprising transition metal oxides.
17. A process according to claim 3 wherein the second intermediate particles are heated to a temperature of at least 500 degrees C.
18. A process according to claim 3 wherein the granules have a pore size in the range of about 0.1 to 20 μm .
19. A process according to claim 3 wherein the first intermediate layer has a thickness of about 30 μm .

20. A process according to claim 3 wherein the second intermediate layer has a thickness of about 5 μm .
21. A process according to claim 3 wherein the second mixture further includes a binder.
22. A process according to claim 21 wherein the second mixture further includes a void-forming material.
23. A process according to claim 21 wherein the second mixture further includes at least one algaecidal material.
24. A process according to claim 21 wherein the second mixture further includes a void-forming material and at least one algaecidal material.
25. A process for producing algae-resistant roofing granules, the process comprising:
 - (a) providing inert base particles;
 - (b) forming green granules by coating the inert base particles with a mixture including;
 - at least one algaecidal material, and
 - a void-forming material, the void-forming material releasing gaseous material at temperatures above 90 °C, and having an average particle size no larger than 2 mm,
 - at least one coloring material; and
 - a heat curable binder; and
 - (c) heating the green granules to release the gaseous material to form pores and cure the binder to produce the roofing granules.
26. A process for producing algae-resistant roofing shingles, the process comprising producing algae-resistant roofing granules, and adhering the granules to a shingle stock material, the algae-resistant roofing granules being produced by a process comprising:
 - (a) providing inert base particles;
 - (b) forming first intermediate particles by coating the inert base particles with a first mixture including;
 - at least one algaecidal material, and
 - a void-forming material, the void-forming material releasing gaseous material at temperatures above 90 °C, and having an

average particle size no larger than 2 mm,

to form a first layer on the inert base particles;

(c) forming second intermediate particles by coating the first intermediate particles with a second mixture including a coloring material; and

(d) heating the second intermediate particles to decompose the void-forming material and form pores in the first layer to produce the roofing granules.

27. An algae-resistant roofing shingle produced by the process of claim 26.